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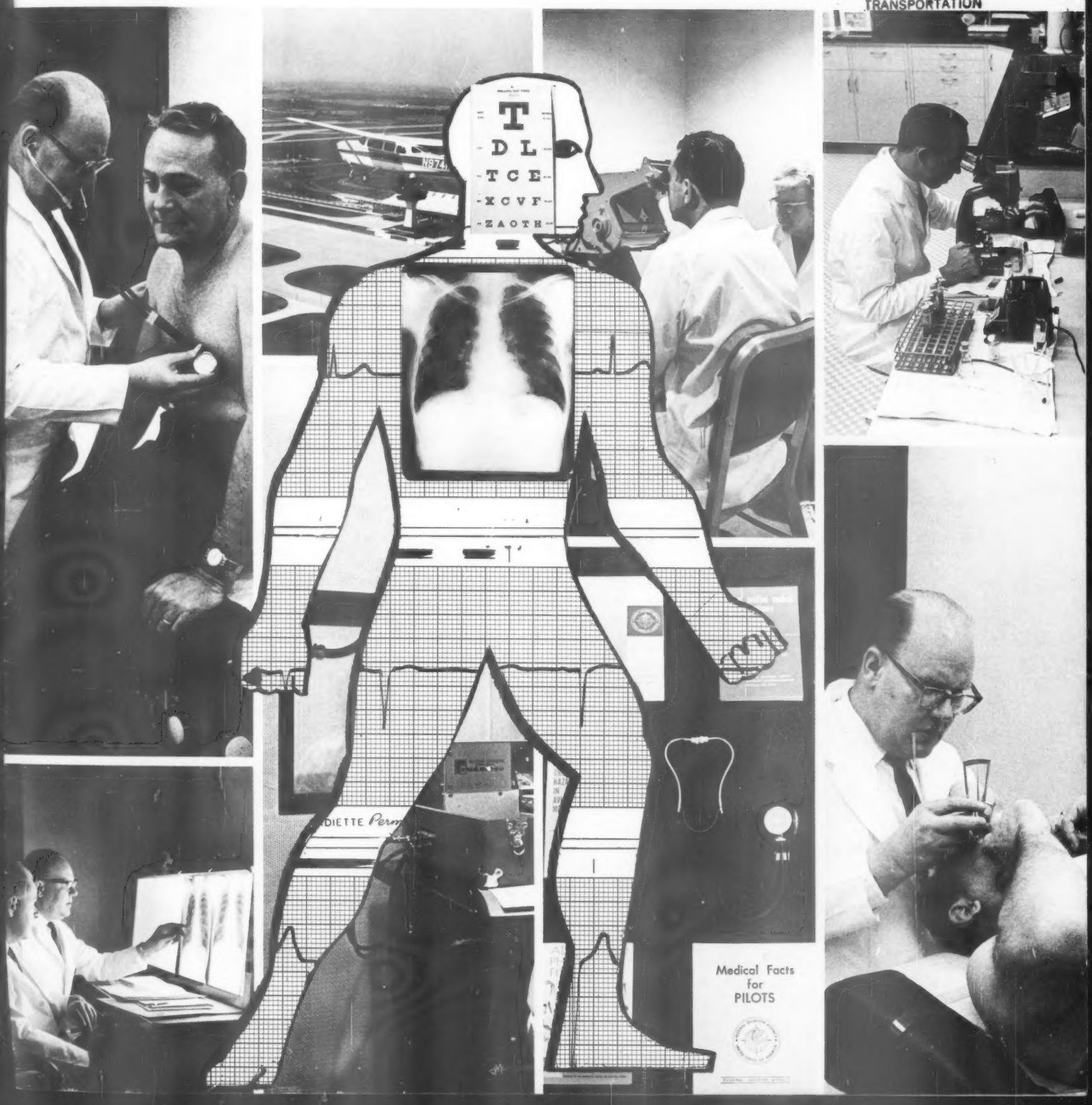

FAA | AVIATION NEWS

F E D E R A L A V I A T I O N A G E N C Y

VOL. 4, NO. 1 MAY 1965

COVER

The safety of flight has been enhanced by the medical standards established for pilots by the Federal Aviation Agency's Office of Aviation Medicine. See pages 12-13.

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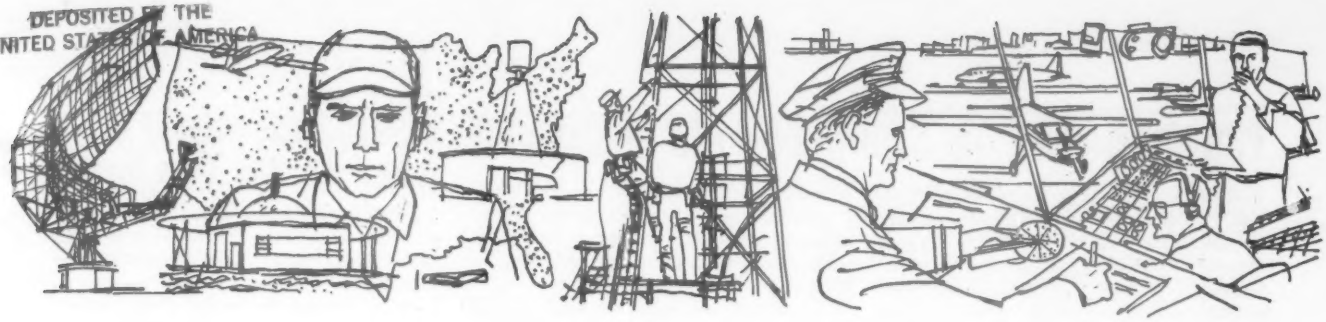


SCIENTIFIC DATA FROM EVACUATION TEST NOW UNDER STUDY

Scientific information on the hazards involved in evacuating a disabled aircraft is now under study by the Federal Aviation Agency following a series of four evacuation tests conducted at Deer Valley Airport near Phoenix, Ariz.

Both day and night tests were conducted by the Flight Safety Foundation April 6 and 8 under an FAA contract.

The mock evacuations took place on the partly-wrecked fuselage of a surplus Super Constellation which was deliberately smashed during an FAA crash test program last September (*FAA Aviation News*, October 1964). For the new series of tests, the interior had been refitted with new seats, with three and two abreast in the front and two abreast on both sides of the aisle in the rear.

The volunteer passengers sat in the plane which simulated a flight from Los Angeles to Phoenix. Two stewardesses gave the normal briefing, took down passenger names and gave out box lunches. Finally, after about an hour, the captain announced over the intercom that they "should be landing at Phoenix in about five minutes." A few minutes later, as they were "approaching" the airport, passengers tightened their seat belts. Then came harsh scraping and crash noises—pretaped—and the actual evacuation followed.

Some of the doors and escape hatches had been purposely jammed to see how passengers would react. Theatrical nontoxic smoke was forced through the cabin to reduce visibility. Of the 45 passengers, four were under secret instructions, not even known to the stewardesses, to simulate disabling injuries. Fellow passengers and the stewardesses had to see that they were carried out.

With a Navy fire truck coming alongside with a red light flashing and a siren screaming one of the passengers said, "I knew this was just a test, but for a moment I thought it was real."

All the passengers were volunteers from the area recruited by the Flight Safety Foundation from the Arizona State University and other sources. The selection was based on a typical airline passenger flight—57 per cent of the passengers were male and 30 per cent female from 12 to 59 years of age, five per cent 60 or older, and eight per cent children under 12. Infant passengers were represented by life-sized dolls.

Observers and representatives from the safety and training divisions of a number of airlines were present. Investigators from the Civil Aeronautics Board were observers and helped interrogate passengers after each of the tests.

The broken aircraft hull lay on a slope with a noticeable tilt in the cabin area. The landing gears, sheared off in the crash test last September, caused the plane to rest close to the ground. Structural damage to the aircraft was obvious both inside and outside.

Remote-controlled motion picture cameras inside the aircraft as well as exterior cameras recorded passenger reaction and other pertinent factors. Precision clocks were used to time the various phases of the evacuation operation.

Results of the tests will be used to plan advance studies of emergency evacuation procedures from an aircraft suffering damage from an impact. Such factors as seat spacing, aisle widths and other related factors are being evaluated.

PROPOSED RULE TO STOP 'LOOK-SEE' PROCEDURE

Pilots would not be permitted to exercise "look-see" procedures when making an instrument approach to runways at certain airports for which the reported visibility is below the minimums prescribed for that runway, under a rule proposed in March by the Federal Aviation Agency.

The proposal is based on enhancing safety through the use of Runway Visual Range (RVR) equipment for determining the horizontal distance a pilot can see down the landing runway from the approach end. The proposal would apply to all pilots, regardless of rating.

Whether RVR equipment is available or not, current rules permit pilots to continue their approach to a runway when reported weather minimums are below those authorized to "take a look" to determine whether reported runway conditions are in fact below the prescribed minimums. The pilot may or may not continue his approach depending upon his observation and visual contact with the runway.

More than 40 airports in the U. S. currently have operational RVR equipment. More equipment is being installed at other qualified airports with the view toward ultimately equipping all major air terminals in the U. S.

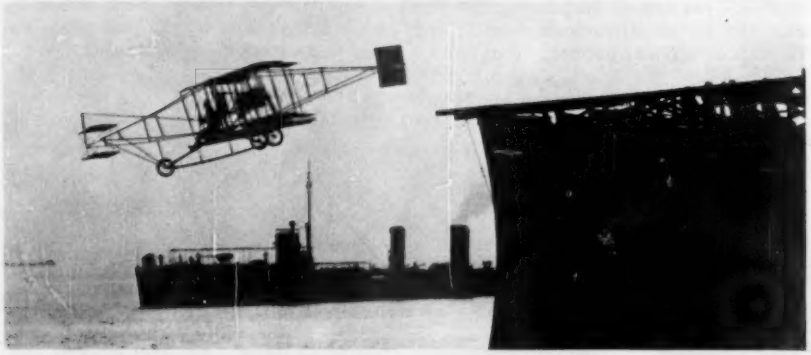
No change is proposed in present instrument approach procedures for runways not equipped with an operative RVR.

"Look-see" privileges would not be authorized under the proposal even though the landing runway is served by an operating ILS (Instrument Landing System) and a PAR (Precision Approach Radar).

Current rules permit pilots of all aircraft except four-engine jets to land at an airport equipped with touchdown zone lights and centerline runway lighting when the RVR for the landing runway is 1,800 feet or more. Pilots operating four-engine jets are restricted to a minimum RVR of 2,400 feet unless the runway is equipped with touchdown zone and centerline lights, in which case minimums as low as 2,000 RVR can be authorized.

Public comments on the proposed rules amendment, "Deletion of 'Look-See' When RVR is Operational" (Regulatory Docket No. 6537; Notice 65-7), will be considered by FAA prior to final action. Comments should be sent in duplicate before May 27, 1965, to FAA Rules Docket, 800 Independence Ave., S.W., Washington, D. C. 20553.

MILESTONES IN AVIATION



A vision of things to come stirred barnacled admirals on Nov. 14, 1910, when a young civilian pilot, Eugene Ely, became the first person to fly off the deck of a ship. Flying a four-cylinder Curtiss biplane, Ely took off from an 83-foot platform built over the foredeck of the cruiser USS *Birmingham* as it lay at anchor at Hampton Roads in Chesapeake Bay, Va.

Two months later, Jan. 18, 1911, Ely bettered this performance by flying 13 miles out to sea from San Francisco, landing on a platform little wider than his plane aboard the armored cruiser USS *Pennsylvania*. He then took off and returned to the city, completing the first shore-to-ship-to-shore flight.

Ely's flights were the forerunners of modern carrier aviation.

Changes Incorporated in 'AIM' Make Publication More Useful

Several additions and changes have been made in the *Airman's Information Manual* (AIM) to make the publication even more useful.

Three former FAA flight information publications were combined into this single operational manual last December. Since that time the FAA has received many helpful suggestions.

Most of the comments from users requested that air navigation radio aids (ANRA) listings be included in AIM because of the need for frequent reference to VOR frequencies.

Other changes incorporated in AIM as a result of subscriber comments include:

- Low/medium frequency radio ranges and radiobeacons and ILS compass locators are tabulated alphabetically by city location within the state.
- Transcribed weather broadcast service data is included in the current flight service station listing or the new ANRA.
- Automatic terminal information service data has been added.
- State names have been included in a prominent manner in Section IV and IV-A.
- A tabulation of commercial broadcast stations has been added to Section IV.

AIM is divided into five separate sections for use in a loose-leaf binder.

An annual subscription to AIM is available for $15 from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

NEW PUBLICATIONS AVAILABLE

The following publications may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402:

- *Personal Aircraft Inspection Handbook*, AC 20-9 (revised 1964); 50 cents.
- *Airline Transport Pilot (Airplane) Examination Guide*, January 1965, AC 61-18; 35 cents.
- *Glider—Private and Commercial Pilot—Flight Test Guide*, January 1962 (reprint); 15 cents.
- *Aviation Weather*, 1965; $2.25.
- *FAA Air Traffic Activity, Calendar Year 1964;* $1.25.
- FAR Part 121, *Certification and Operation: Air Carriers and Commercial Operators of Large Aircraft;* $1.
- *U. S. Civil Aircraft by State and County as of January 1964;* 60 cents.
- *Private Pilot's Handbook of Aeronautical Knowledge* (reprint) 1962, $2.50.

AIR SAFETY, ECONOMY, KEY WORDS IN FAA REPORT

Progress toward greater air safety and economy in Agency operations are highlighted in the Federal Aviation Agency's *Sixth Annual Report,* submitted by Administrator N. E. Halaby to the President and the Congress last month. The report covers fiscal year 1964, which ended June 30, 1964.

Deliberate wrecking of a wornout airliner carrying instrumented dummy passengers and equipment produced information designed to save lives. The experiment was aimed at solving one of aviation's most pressing problems—reducing fatalities in survivable accidents.

Emergency evacuation tests formed the basis for FAA regulations to protect passengers in survivable accidents. Although jet aircraft can seat almost twice as many persons on the average as piston aircraft, jet passengers could get out twice as fast because of improved procedures, evacuation exits and emergency equipment on jet aircraft.

The FAA continued its efforts to update the education, training and certification of aviation mechanics. Five public and private aviation schools were selected to test the practicality of authorizing mechanic schools to test their own graduates and recommend certification by FAA. This parallels the examining authority delegated by FAA to certain flight schools. If successful, the program could result in significant savings in FAA manpower currently required to individually examine applicants for aviation mechanic certificates.

Plans were made for a general aviation maintenance difficulty reporting system, similar to the present airline reporting system. Following completion of a field prototype system for general aviation, discrepancy reports on specific aircraft or component systems will be funneled daily into Washington by FAA field personnel and tabulated by automatic data processing equipment. The data will alert the FAA and users to materiel defects and maintenance system flaws.

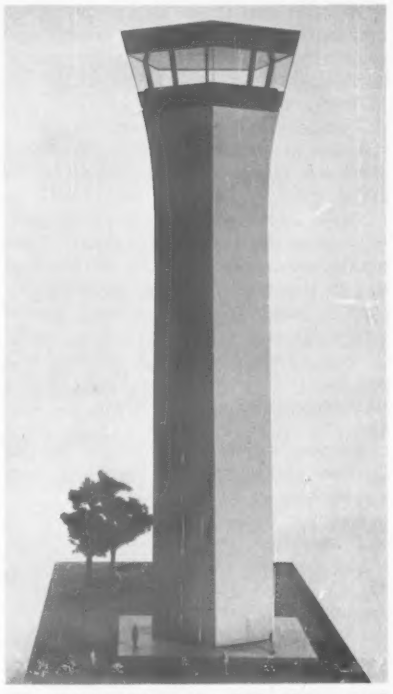
Contracts for construction of the first FAA standard design airport control towers were awarded during the year. Thirteen contracts were awarded for utility steel towers at VFR airports. Site studies were conducted at various other locations for later construction of concrete shaft type standard design towers at airports which provide radar as well as VFR air traffic service.

An extensive study of civil/military long-range radar systems resulted in FAA-Department of Defense agreement on selection of hard-core systems to meet current and future needs for radar coverage. This included ways of reducing the over-all number of long-range radars, from the present 166 to a total of 145 systems, through an enlarged joint-use program. Average recurring maintenance cost for 16 of the 21 military systems to be eliminated is estimated to be at least $1 million per system. Annual FAA maintenance costs for the five remaining FAA radars and associated remoting systems amount to approximately $885,000.

To minimize possible adverse effects of turbulent air on jet aircraft, the FAA revised jet flight procedures for rough air operations and set up special jet pilot training programs on turbulence penetrations. In cooperation with industry, the FAA explored and tested new methods and equipment for identifying, tracking, and displaying turbulent air masses. Pilot performance and engineering data under conditions of severe turbulence were obtained both in flight and in laboratory simulation programs.

The FAA *Sixth Annual Report to the President and the Congress* may be purchased for 50 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

NEW TOWER DESIGN



The FAA will receive bids this month for construction of 10 concrete-shaft airport traffic control towers at U. S. airports. All will be of one standard design. Size will depend upon activity.

AIR CHIEFS MEET

FAA Administrator N. E. Halaby, left, and Senor Ing. Ramón Pérez Morquecho, Director General of Civil Aeronautics for Mexico, confer on the airstrip during the first International Hangar Session sponsored recently at Tucson, Ariz.

Legislation Asked for Aerospace, Science Exposition

N. E. Halaby, Administrator of the Federal Aviation Agency, announced last month that Congress would be asked to provide enabling legislation to carry out the Federally-sponsored International Aerospace and Science Exposition authorized by President Johnson.

The 10-day exposition will be held at Dulles International Airport in the summer of 1966. It is expected to provide a major showcase for the display of U. S. and selected foreign aerospace products and related science equipment.

The objective of the exposition is twofold: To stimulate export sales of U. S. products, thereby helping to stem the flow of gold from the country, and to graphically demonstrate to the world U. S. development, accomplishments and leadership in the aerospace sciences and related sciences. The exposition will offer American producers a national forum for display of their products comparable to those in Paris, London and Moscow.

AIRCRAFT OPERATIONS REACH NEW HIGH IN 1964

Aircraft operations in the U. S. increased 10 per cent for the second consecutive year in 1964 setting a new record, according to figures released by the Federal Aviation Agency.

Terminal and en route aircraft activity statistics are reported in the publication, *FAA Air Traffic Activity, Calendar Year 1964.*

Ten per cent gains for 1964 were made in each of three major categories: Total aircraft operations (take-offs and landings at 278 airports with FAA airport traffic control towers)—34.2 million; instrument approaches at Air Route Traffic Control Center (ARTCC) areas—1.005 million; IFR (Instrument Flight Rule) aircraft handled at ARTCCs—11.7 million.

Services provided by Flight Service Stations and Combined Station/Towers also showed an increase over 1963.

The five busiest airports in terms of total operations were all repeaters from 1963. Counting every landing and take-off, Chicago O'Hare led with 460,227 operations, followed by Long Beach, Calif., 422,620; Van Nuys, Calif., 386,-063; John F. Kennedy International, 367,139; and Los Angeles International, 365,536.

Counting only itinerant operations, which exclude purely local flights, O'Hare led with 459,764 take-offs and landings, followed by John F. Kennedy International, 363,222; Los Angeles International, 340,834; Washington National, 289,884; and Dallas Love Field, 251,204.

O'Hare also led in the air carrier operational category with 389,640 airline take-offs and landings, followed by John F. Kennedy International, 328,396; Los Angeles, 289,774; Washington National, 210,718; and San Francisco International, 187,783.

The five busiest airports in terms of general aviation itinerant flights were Long Beach, 194,615; Van Nuys, 167,-775; Phoenix, 151,980; Santa Monica, Calif., 134,237; and Fort Lauderdale, Fla., 133,199.

Rank order listings of 278 airports with FAA airport traffic control towers of four operational categories are included, with en route and other data, in the publication which is on sale for $1.25 by the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

Aviation Accident Investigators Inaugurate Air Safety Society

Leading experts on the causes of aviation accidents have recently formed an organization called the Society of Air Safety Investigators.

Sparked by Joseph O. Fluet, chief of the Civil Aeronautics Board's Bureau of Safety, the initial group of more than 100 is largely from the CAB.

However, other charter members are from FAA, the Flight Safety Foundation, the military, private manufacturers, universities, the airlines and the ranks of airline pilots. Rigid membership rules require work in the accident investigation field for five years and actual participation in at least 10 crash problems, or three years in the investigative field and 50 actual investigations.

Membership is not limited to the United States.

Provisions have also been made for association members and honorary members.

Sponsors of the organization have felt that one of the major problems in the air safety field is the lack of adequate liaison among men specializing in crash investigations and solutions.

FOG CHAMBER STUDY

Studies on the effectiveness of runway lights in fog and poor weather are being conducted for the FAA inside the fog chamber at the University of California's Richmond field station. The experiments are to determine the best color, intensity and pattern of airport runway lighting. A cockpit, fixed to a steel-backed girder, rolls down over the test lights by sliding along grooves, simulating approach and landing. Above right, engineers check runway lights which, like the 1,000-foot runway, have been scaled to one-tenth size giving the impression of a 10,000-foot runway. The fog used in experiments is produced by piping compressed air and steam into the tunnel-like chamber.

WILL ROGERS TAKES HIS FIRST AIRPLANE RIDE

Forty years ago this month, Will Rogers, one of America's all-time favorite humorists, took his first airplane ride. His pilot was Gen. Billy Mitchell. Rogers' account, taken from Donald Day's Autobiography of Will Rogers, *is reprinted with permission from the Rogers Co. and Houghton-Mifflin Co.*

General Mitchell came and got me and we drove across the river to an aviation field. An assistant handed me a straight jacket, a kind of a one-piece suicide suit and a kind of a derby hat with the brim turned down over your ears. It slowly began to dawn on me that at last there was going to be some flying done in the Army, and that I was supposed to be one of the participants.

There is an old legend that says, "Nine-tenths of the brave things done are performed through fear." Whoever concocted this aforementioned legend certainly had this air voyage of mine in mind. I did not want to see Washington by air. In fact I never had any desire to see anything from the air.

Well, there was so many standing around that there was no way to back out. Right at the moment I thought the fellows who were trying to get this Mitchell out of the air service were right, and I wished they had got him out sooner. He says, "Do you use cotton in your ears?" He seemed to think that I was an old experienced aviator. I says: "No, I only use cotton in my ears when I visit the Senate Gallery." I couldn't imagine what the cotton was for unless it was to keep the dirt out of your ears in case of a fall.

Photographers were there to get our picture. I could just see the picture with this label under it: "Last Photograph Taken of Deceased." But Mr. Mitchell stopped them and asked them if they would mind waiting until we came back. Well, that didn't make me feel any too good. It looked like there might be a doubt in his mind as to whether we would come back. There was a superstition connected with it some way that didn't make me feel any better. Still, it didn't make me feel any worse, because I was just as worse as I could feel. But I never let on. I remembered how nice the papers always speak of a man who goes to the gallows with a smile on his face, and how they laud his nerve.

A man buckles you in so that you won't change your mind after you leave the ground. Mitchell says, "I will point out the places of interest to you." I didn't see him point nor I didn't see what he pointed at. I have always heard when you are up on anything high, don't look down; look up. So all I saw was the sky.

Washington's home at Mount Vernon might have been Bryan's in Miami for all I know. We flew around Washington Monument and if the thing had had handles on it he would have lost a passenger.

Here I was thousands of feet up in the air when you can't even get me to ride a tall horse. I had always figured that if the Lord intended a man to do any flying he would have sprouted something out of his back besides just shoulder blades. He asked me if I saw the *Mayflower*, the President's private tug. How was I going to see it unless it was flying over us? I didn't come any nearer seeing it than I'll ever come to riding on it. When we landed and got out and walked away I was tickled to death. I thought the drama was all over. But it wasn't.

The most impressive part of the whole thing was in his next few words. He says: "You have been with me on the last flight I will ever make as a Brigadier-General. Tonight at 12 o'clock I am to be demoted to a Colonel and sent to a far away Post where, instead of having the entire air force at my command, there will be seven planes." Well, I got a real thrill out of that. To think that I had accompanied such a man on such a memorable flight.

I had a long talk with Mitchell. He never squealed and he never whined. He knows that some day America will have to have a tremendous air force, but he can't understand why we are not training it now. But it does seem a strange way to repay a man who has fought for us through a war, and who has fought harder for us in Peace to be reprimanded for telling the truth. And wasn't it a coincidence that we had just flown over Washington's home, the Father of our Country, whose first claim to Fame was telling the truth about a Cherry Tree! But George wasn't in the Army then, and the Cherry Tree had nothing to do with our National Defense.

A decade after Will Rogers took his first flight with Mitchell, Rogers, left, and Wiley Post, second from right, were killed when their airplane crashed in Alaska. The photograph was taken shortly before the accident.

RULES OF THE ROAD

OPERATING IN T

This is the third in a series on "Rules of the Road."

The problem of providing for the safe and orderly movement of air traffic around airports has been with us since the early days of aviation.

In the 1920s, for example, flagmen were stationed at busy airports near the end of the runway-in-use to signal take-off and landing clearances. A checkered flag generally was used for "go" and a red flag for "stop."

One of the first of these pioneer airport controllers was the new director of FAA's Air Traffic Service, Archie W. League. He began his career at the St. Louis municipal airport directing traffic from atop a wheelbarrow on which a large umbrella was mounted to protect him from the sun. Later, he moved his operation to an enclosed tower atop the airport administration building.

In 1930, a new dimension had been added to airport traffic control—radio communications in the tower at the Cleveland municipal airport. It proved successful, and during the next five years approximately 20 other city towers followed Cleveland's lead.

But the operation of airport control towers by municipalities and other local government agencies left much to be desired. For example, procedures varied greatly from location to location, and this lack of standardization proved confusing to pilots. Then, too, the limited number of tower facilities failed to meet the increasing demands of civil and, especially, military aviation for control services at airports.

These considerations led the Federal Government to assume responsibility for the operation of control towers in November 1941. The Civil Aeronautics Administration—FAA's immediate predecessor—was designated as the operating agency.

By the end of 1941, 27 control towers were staffed by CAA. One year later, the number was 81.

At the same time CAA began operating airport towers there were no rules requiring pilots to follow instructions from the tower. As a result, a Civil Air Regulation was issued stating that no one could operate an aircraft within an airport control zone or during an approach for landing contrary to traffic control instructions from the tower. Other rules made effective control of air traffic around airports possible.

Today FAA operates 278 control towers in the 50 states and the various territories. Last year, these facilities handled 34.2 million take-offs and landings.

Only aircraft with two-way radio communications are permitted at airports with a control tower operated by the Federal Government. This provision in Part 91 of the Federal Aviation Regulations covers towers staffed by FAA or military personnel.

Pilots are required to maintain two-way radio communications with the tower when operating within the "airport traffic area." Exceptions from this rule are permitted, however, in the event a pilot experiences radio failure in flight.

The "airport traffic area" is defined as "that airspace within a horizontal radius of five statute miles of the geographic center of any airport at which a control tower is operational, extending from the surface up to, but not including, 2,000 feet above the surface." Pilots may not enter this area unless they intend to use an airport in the area.

FAA also has established speed restrictions for aircraft operating in the vicinity of airports. FAR Part 91 specifies that a pilot may not fly any aircraft at more than 288 miles per hour below 10,000 feet when he is within 30 miles of his destination airport. The maximum speed is even lower within the airport traffic area—230 m.p.h. for jets and 180 m.p.h. for piston aircraft.

Higher speeds are permitted, however, when required to

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THE TRAFFIC PATTERN

maintain safe maneuverability or to comply with normal military operating procedures.

FAR Part 91 also states that no one may land or take off from any controlled airport without a clearance from the tower. Similarly, a pilot may not taxi an aircraft on a runway without an appropriate clearance.

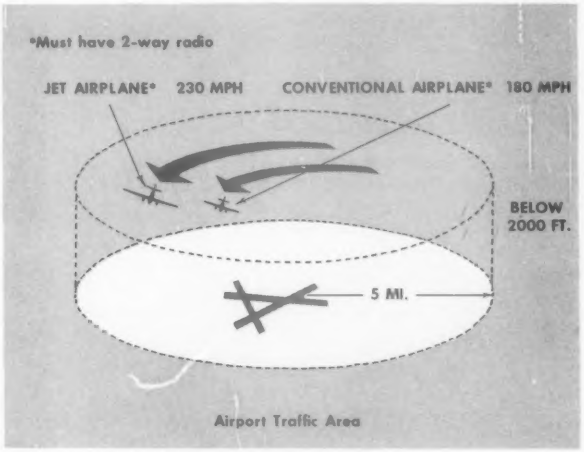
When approaching to land at a controlled airport, airplanes must circle to the left unless the tower authorizes a different pattern. Helicopters are required to avoid the flow of fixed-wing aircraft.

The same approach procedure applies at uncontrolled airports "unless the airport displays approved light signals or visual markings indicating that turns should he made to the right."

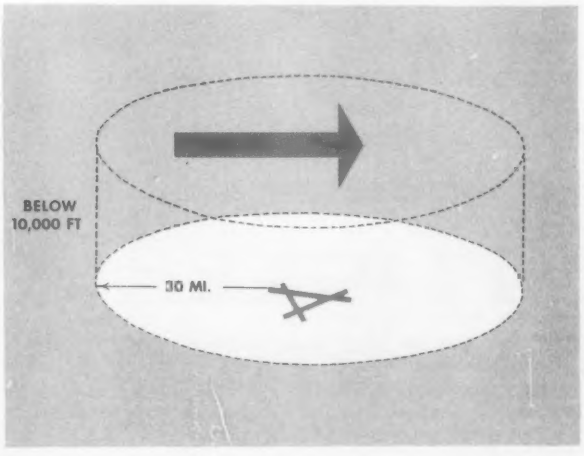
The regulations further state that an aircraft departing from an uncontrolled airport shall comply with any FAA traffic pattern for that airport.

"Special air traffic rules," prescribed for airports such as John F. Kennedy International and Washington National, may be found in Part 93 of the FARs.—J.L.

o-way radio communiion capability is reired for all aircraft at ports where the control wer is operated by the deral Government. Gen- l aviation pilot, left, s his two-way radio keep in touch with the wer before taking off. ght, tower controllers e taxi, runway clearce and take-off instrucns to pilot. Above, ot has completed his ght and follows instrucns from tower controlrs to the correct ramp.



Diagrams show the speed limits of aircraft flying in the airport traffic area, above, and of aircraft in the general vicinity of airports, below.



FLICKER VERTIGO

According to legend, Roman slave merchants painted a white mark on a potter's wheel and forced slaves to sit on a wood stool and stare at the turning disc. Some became violently ill, but those who could endure the stroboscopic effect for a certain period of time with no physical discomfort were considered first class specimens who brought a higher price on the market.

Some pilots and passengers experience a similar sensation from flickering lights caused by helicopter rotorblades, the rotation of an idling propeller or the intermittent flashing of an aircraft anticollision beacon reflecting from clouds. The sensation can cause discomfort including nausea and even epileptic-like seizures.

Severity of the attack has been found to be dependent upon frequency and intensity of the flash and individual susceptibility.

In a study of 102 Navy helicopter pilots, the alertness of one-fourth was impaired by the effect of sunlight chopped by helicopter rotor blades or light from a rotating beacon reflected from clouds. Another report indicated one pilot actually lost consciousness while landing into the sun with the propeller idling.

The phenomenon has also been observed when flickering television sets have induced similar symptoms in some viewers, particularly children.

The aviation community has been aware of the problem for years and the users of rotating beacons have been cautioned against the dangers involved.

FAA's Civil Aeromedical Research Institute (CARI) in Oklahoma City is now taking a deep look into the problem called flicker vertigo.

The CARI tests involve equipment somewhat more elaborate than a potter's wheel and wood stool. A mockup cockpit salvaged from a light aircraft has been fitted out with a rotating beacon mounted atop the cabin, and the entire assembly has been placed into the research institute's environmental chamber. This particular chamber can duplicate temperatures ranging from minus 60 degrees to plus 160 Fahrenheit, and any combination of wind and moisture.

Since the symptoms of flicker vertigo can approximate those of an epileptic seizure and are measurable on an electroencephalograph (EEG), this instrument is used to record brainwave patterns. Each subject is wired for the EEG by fastening electrodes to certain positions on his head with a conductive ointment. These points record brainwave patterns from six areas of the brain, plus eye movements up and down and from side to side.

Trailing wires, the subject then enters the cockpit and focuses his attention on a visual fixation point, a small red light, which is the only illumination in the test area at the time. For 10 minutes the subject is allowed to sit relaxed with his eyes on the small light. Then for 10 minutes the red rotating beacon is turned on. A final 10 minutes without the beacon determines any residual effects of the flickering light. Recorded engine noises are present at all times.

The test is given twice—once with the chamber empty and again with the chamber filled with fog to simulate cloud penetration. Results of the tests are printed on the EEG tape which is then reviewed by the investigators for evidence of wave patterns related to the flashing light.

The present tests incorporate a rotation of 90 flashes per minute. The next step is to increase the rate of speed and the intensity of light. Later the sensation of rotor blades will be introduced.

Final results of the current testing program will not be available for several months.

Reading clockwise, from upper left: ● A CARI doctor attaches 12 electrical leads to the panel behind the subject's head. The leads transmit electrical impulses to the EEG machine which records six areas of the brain, plus eye movements. ● Mockup cockpit is shrouded to simulate the effect of a rotating beacon when an aircraft penetrates a cloud formation. ● Technician indicates the normal stylus trace of the horizontal eye movement before beginning test. ● A CARI employee is wired for a "flight" in the mockup by an electroencephalograph technician.

AVIATION MEDICINE

Dr. M. S. White, Federal Air Surgeon of the Federal Aviation Agency, is certified in aviation medicine by the American Board of Preventive Medicine and is also certified in internal medicine and cardiovascular diseases. He has been a flight surgeon for nearly 29 years.

In 1940 he made the first electrocardiograph recordings and the first complete scientific study of heart action in high altitude flying. His work formed the basis for many present-day techniques for recording biological functions in the investigation of human factors in flight.

Prior to his reporting to the FAA on Oct. 1, 1963, Dr. White was Command Surgeon of the Air Training Command, Randolph Air Force Base, San Antonio, Texas. He is still on active duty as a Major General in the United States Air Force.

When Dr. White was appointed to his present position, FAA Administrator N. E. Halaby said, ". . . he brings particularly outstanding qualifications for handling the critical tasks ahead in learning more about the human element in civil aviation. Dr. White's background and experience make him uniquely suited to lead the way in this important work."

By M. S. White, M.D.
Federal Air Surgeon

A 48-year-old pilot flying alone in a small aircraft on his first solo flight climbed to approximately 300 feet. Suddenly, the plane's movements became erratic and eventually it crashed into a parking lot of a shopping center, striking an automobile and killing the occupant.

A 50-year-old pilot flying his own plane with his wife beside him suddenly drew back in his seat in a rigid position, then slumped unconscious onto his wife's shoulder. His wife, who was not a pilot, crash-landed the plane. Her husband had died.

In both cases, investigation of medical histories disclosed the men had previous heart attacks and treatment, apparently with excellent recovery. These histories had not been reported to the Federal Aviation Agency by the personal physicians of the pilots.

There are many cases where a relationship between the medical condition and the accident has been established. In others, although the link was not established, it was likely.

In the field of civil aviation, the Federal Aviation Agency has been authorized to provide for the safety of flight. The medical aspects of this responsibility have been assigned to the FAA Office of Aviation Medicine which recognizes a person's right to fly, but at the same time must ground those whose physical condition creates a hazard to themselves and others.

In determining the medical qualifications of civilian pilots, the flight physical examination is used as a screening procedure, not a comprehensive medical evaluation. Its value depends upon its ability to determine the medical status of the individual in connection with the duties he must perform as an airman.

The frequency of examination varies with the level of piloting responsibility. For example, private pilots, those who do not fly for hire or remuneration, are examined every two years. Commercial pilots, such as flight instructors, crop dusters, aerial photographers and corporation pilots are examined annually. Airline transport pilots are examined every six months.

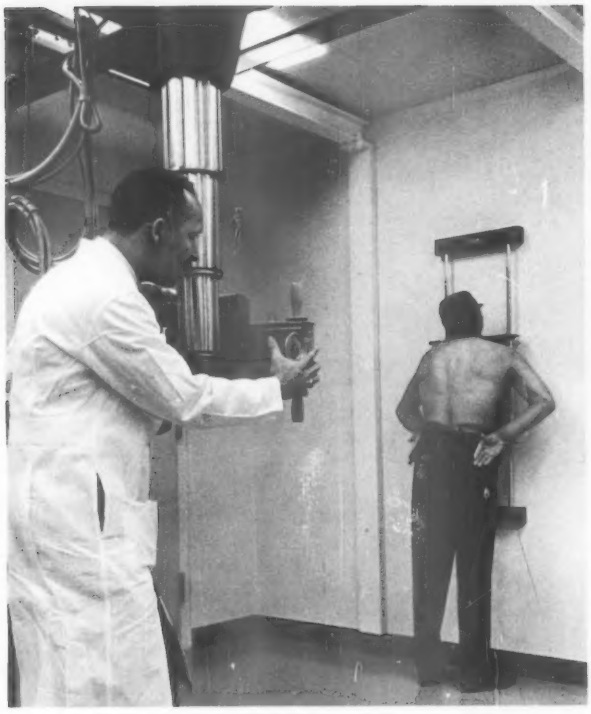
Among the causes for disqualification are:

- Chronic alcoholism.
- Drug addiction.
- Epilepsy.
- History of psychotic disorder.
- Disturbance of consciousness without satisfactory medical explanation.
- History of heart attack.
- Diagnosis of angina pectoris or other evidence of coronary heart disease.
- Diabetes requiring hypoglycemic medication.

Just as the frequency of examination varies with the level of responsibility, the application of medical standards also varies, the highest level being applied to airline transport pilots.

There are three types of medical certificates—first-class, second-class, third-class—as well as a special issue certificate. The requirements for each of these change in proportion to the type of certificate requested.

The medical standards for civil airmen are contained in Part 67 of the *Federal Aviation Regulations;* single copies of Part 67 can be purchased for 15 cents from the Super-



Below, Dr. White, right, is checked out in an H-13 before getting his helicopter rating. Left, a pilot is x-rayed during his flight physical examination. General aviation pilots take a physical every two years.

intendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

The authority of the Administrator under Section 602 of the Federal Aviation Act of 1958 (49 U.S.C. 1422) to issue or deny medical certificates is delegated to the Federal Air Surgeon. He has the authority to:

- Examine applicants for and holders of medical certificates for compliance with applicable medical standards.
- Issue, renew or deny medical certificates to applicants and holders based upon compliance or noncompliance with applicable medical standards. Without standards, equal treatment could not be assured to the 400,000 active civil airmen.

In our system of government, regulated members of the general public—in this case pilots and other airmen—have a right to know the standards under which their fitness is judged. In support of this tradition, the Administrative Procedure Act provides for public participation in establishing these regulations.

Our internal guidance material is developed in various ways. An important source is the experience of members of the Office of Aviation Medicine who are engaged in the review of medical certification cases, flight incidents and aircraft accident investigations, and who have knowledge of the probable effect of various diseases, especially those which can produce sudden incapacity.

We also obtain information from various professional groups and from precedents established by the decisions of the Federal Air Surgeon's Medical Review Board and the Administrator's Medical Advisory Panel. (*FAA Aviation News*, January 1965.) The guidance material which is developed is the best expression of available aeromedical knowledge, in terms of recommended criteria of medical fitness for flying.

We also consult with medical professional associations, pilot and other aviation industry groups, and special consultants appointed for specific purposes.

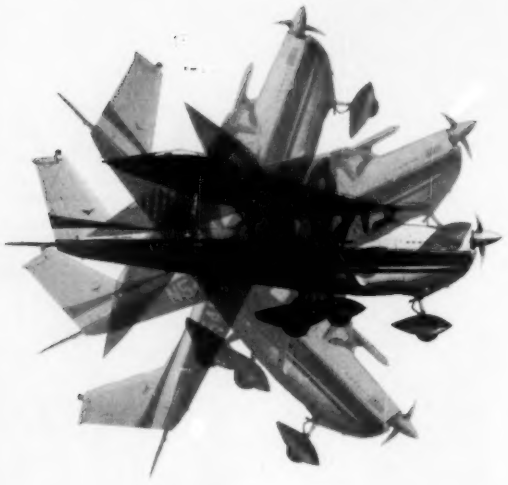
Although we hope to maintain a continuing review of all the medical standards, priority consideration is being given to:

- Distant visual acuity.
- Contact lenses.
- Glaucoma.
- The need for special standards for air traffic control personnel.

The incidents set down at the beginning of this article indicate how medical problems may have a relationship to aircraft accidents. We could continue with additional case abstracts dealing with cerebral vascular accidents, convulsive seizures, brain tumors, visual defects, fatigue, incapacity from toxic sprays, and so forth.

We are still far from determining the exact rate at which such problems produce accidents. There is a need for broadening the program of medical investigation to cover all accidents and to make the investigations we now conduct more comprehensive.

Physicians generally can assist us by identifying patients who are pilots and taking this fact into consideration when significant medical conditions have been diagnosed and when treatment is prescribed. In general, any medication which has a primary or incidental effect on the central nervous system is considered hazardous when taken by a pilot. Proper advice to the patient can go a long way toward preventing unwarranted risks for pilots, passengers and persons on the ground.



SAFETY FIRST

Which Way Is Up?

Spatial disorientation, not to be confused with flicker vertigo *(pages 10-11)*, simply means the inability of a pilot to tell which way is up. This certainly is not meant to be humorous.

Frequently, we say that the attitude of an aircraft is generally determined by reference to the natural horizon. And when the natural horizon is obscured, the attitude can still be maintained by surface references. But, when surface references and the horizon both are not visible, the attitude of the aircraft must be determined by artificial means—from an attitude indicator or other flight instruments.

The orientation of a pilot is determined by what he sees and this is supported by his other senses. However, during periods of poor visibility the supporting senses may conflict with what is seen.

When this happens, a pilot is particularly vulnerable to disorientation. The degree of disorientation varies considerably with existing conditions and individual pilots.

Surface references or the natural horizon may become obscured by clouds, smoke, fog, smog, haze, dust, ice particles or other phenomena, although visibility may be above VFR minimums. This is especially true at airports located adjacent to large bodies of water, or sparsely populated areas with few surface references. Lack of horizon or surface reference is common on over-water flights, at night or during other conditions of low visibility.

Another condition restricting both horizontal and vertical visibility is commonly called "white-out." White-out is generally caused by fog, haze or falling snow blending with the snow-covered earth surface and obscuring all outside references.

Here are some of the basic steps which should assist materially in preventing spatial disorientation:

- Before you fly with less than three-miles visibility, learn how to fly by instruments and maintain your proficiency.
- Always use your flight instruments when flying at night or in reduced visibility. Keep in mind, that should you become spatially disoriented it will still take you time to recover when you switch your reference to instruments. Recent tests conducted by the U. S. Air Force with qualified instrument pilots indicated that it can take as much as 35 seconds to establish full control. Meanwhile, your aircraft may have traveled a mile or more horizontally—and perhaps hundreds of feet vertically.
- Maintain night currency if you intend to fly at night. Include cross-country and local operations at different airports in your training.
- Study and become familiar with the unique geographical conditions in areas where you intend to fly.
- Check weather forecasts before departure, en route and at your destination. Be alert for changes in the weather.
- Do not attempt VFR flight when there is a possibility of getting trapped in deteriorating weather.
- Rely on instrument indications unless the natural horizon or surface reference is clearly visible.

You and only you have full knowledge of your limitations. Know these limitations and be guided by them.

Letters

FAA

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but initials will be withheld on request.

• Applause from SAC

I would like to express our appreciation to your air traffic agencies for their outstanding performance during recent SAC exercises. These exercises involved the movement of numerous tactical aircraft to widely dispersed overseas installations with minimum notice.

The expeditious handling of our flight plans and the professional performance of your controllers resulted in a smooth integration into an already burdened traffic system and enabled our aircraft to reach destinations without deviation or delay. Particularly impressive was the rapidity with which an altitude reservation request was processed, coordinated and approved.

The close cooperation we received was gratifying.

Gen. John D. Ryan, USAF
Commander in Chief
Strategic Air Command

• Positive Control and Jet Routes

Would you straighten me out on the FAA proposals to lower the floor of positive control from 24,000 feet to 18,000 feet and to lower jet routes to 18,000 feet?

Initials withheld

FAA's Notice of Proposed Rule Making to lower the floor of the positive control area from 24,000 to 18,000 feet for all aircraft over much of the country was withdrawn for further study last July.

The base of jet routes was lowered to 18,000 feet when the "two layer" airway system was implemented on Sept. 17, 1964, to replace the "three layer" system.

• Wing Load

There are two illustrations on page 49 of FAA's *Flight Instructor's Handbook* which show the effect of CG location on load carried by the wing. In the past, reference material always stressed the downward force on the tail as shown in the top illustration. The idea expressed by the bottom illustration, which shows the tail surface actually providing lift, seems to be a new concept.

I can readily understand new large aircraft, especially jets, might well have lift provided by the tail surface, but I do question whether this situation exists in light aircraft.

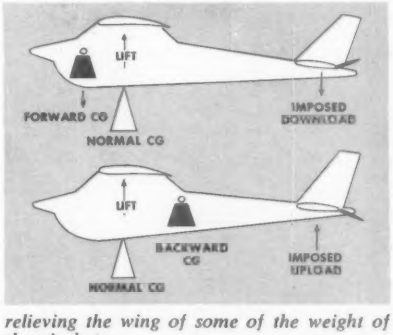
As a flight instructor and flight school operator, I would appreciate any comments you might have as to whether we should apply this idea to our instruction in light aircraft or whether we should continue to explain the tail surface as providing balance through a downward force.

J. E. M.
Wappingers Falls, N. Y.

In reading through the Flight Instructor's Handbook, *you will note in the introduction to Chapter III, that it does not seek to cover aerodynamics generally, but only to emphasize principles which are often misunderstood or overlooked by flight instructors. One such misunderstanding is the common belief that the most forward loading possible will always result in better airplane performance. This is not always the case.*

Ideally, an airplane in level cruising flight will impose neither up nor down load on the tail surfaces if it is loaded with the center of gravity at the "normal" location for which it is designed. Actually, this situation can exist only with a specific power setting, airspeed and center of gravity location.

Assuming that such a balance has been achieved, the moving of a passenger from a rear seat will impose a greater load on the wing by requiring a down load on the tail to maintain level flight, as in the Flight Instructor's Handbook. *In the same situation, moving a passenger from a front to a rear seat will necessitate an up load on the tail group,*



relieving the wing of some of the weight of the airplane.

Lift provided by the tail surfaces will probably not be so efficient as that produced by the wing, and so is unlikely to increase the cruising speed. A down load on the tail, however, imposes a greater penalty on the cruising speed because it involves both additional drag and a greater load on the wing. Figure 7 is intended only to illustrate this effect. It does not imply that it is general practice for designers to use the tail surfaces for a significant amount of lift in level flight. The best cruising speed will always be realized with the least practicable loading, either up or down, on the tail surfaces. In practice, the pilot can take advantage of this knowledge by regularly loading his airplane so that the indicator is as nearly as possible in the center of the trim scale during cruising flight. The necessity for "nose up" trim will usually impose a greater penalty on cruising speed than will the need for an equivalent amount of "nose down" trim.

• Happy Day

I received my private pilot's license in 1936 after taking the flight and written examinations, bought a plane in 1939 and flew it and others all over the country and parts of Alaska.

I got married in 1944 and soon determined that I could not support a wife and an airplane at the same time. One had to go and, as any married man knows, it had to be the plane. Now the happy day has arrived when I can foresee the possibility of being able to fly again.

I would like permission to resume flying on my private pilot's license without starting all over again with a student's permit as though I had never been in an airplane. Is this possible?

Initials withheld

We sympathize with the decision you had to make in 1944, but being uncertain about your reference to "the happy day" we reserve comment on that point. However, a private pilot certificate issued or last renewed before July 1, 1945, expired on July 1, 1947, and cannot be renewed or reinstated. There is no requirement, however, that you must go through your whole flight training to qualify for a new certificate.

All of your flight time will be accepted toward the 40-hour requirement for a private pilot certificate. But you must hold a student pilot certificate, endorsed for solo and solo cross-country flights by a flight instructor who has checked your competency for these operations. You also will have to obtain at least three hours of flight instruction in preparation for the private pilot flight test.

You will, of course, be required to hold a current medical certificate and pass the usual written and flight tests.

• Charter Service

We are licensed commercial pilots who are thinking of forming a chartered service or buying an existing service. Could you furnish us with the necessary regulations?

Initials withheld

If large aircraft (over 12,500 pounds maximum certificated take-off weight) are to be used, Part 121 of the FARs applies. If smaller aircraft are to be used, Part 135 of the FARs will apply. We have forwarded both, along with Advisory Circular AC 120-14, "Air Taxi Operators and Commercial Operators of Small Aircraft."

Please contact your local FAA Supervising Inspector, General Aviation District Office, Box 2397, Municipal Airport, Oakland, Calif. 96614, for the application form.

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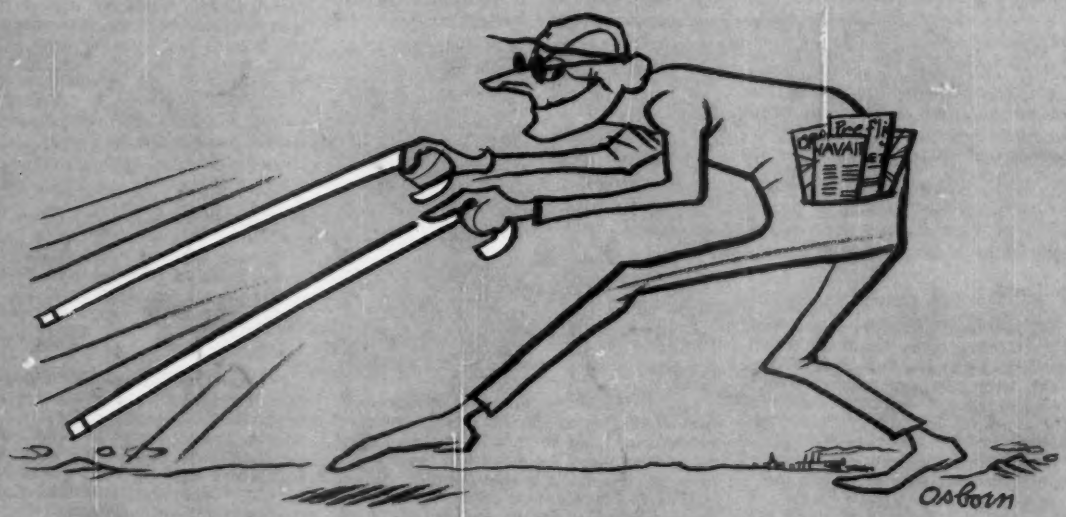

Get a briefing, play it smart.